

LIATRIS GHOLSONII (ASTERACEAE: EUPATORIEAE), A
NEW BLAZING STAR FROM THE APALACHICOLA RIVER
BLUFFS AND RAVINES IN FLORIDA

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ABSTRACT

A new species of *Liatris* (Asteraceae: Eupatorieae.) is described from Liberty County, Florida. Presumably its closest relative is *L. gracilis*, from which it differs in morphology, chemistry, and ecology. The species is diploid ($n = 10$).

KEY WORDS: Asteraceae, *Liatris*, blazing star, endemics

RESUMEN

Se describe una nueva especie de *Liatris* (Asteraceae: Eupatorieae.) del condado de Liberty, Florida. Probablemente su pariente más cercano es *L. gracilis*, de quien difiere en morfología, química, y ecología. La especie es diploide ($n = 10$).

The upper Apalachicola River region in the Florida panhandle has long been known for its diverse and unique flora. Asa Gray (1875) visited the area to observe *Torreya taxifolia* Arn. E.E. Callaway (1966), theologian, amateur archeologist, and one-time gubernatorial candidate in Florida, cited the unusual flora in support of his claim that the original Garden of Eden was located there. Further, he suggested the *Torreya* tree provided the Biblical “gopherwood” used in constructing Noah’s ark. Although his ideas did not gain wide acceptance, many endemic taxa are nonetheless known from the area (Clewell 1977; Myers & Ewel 1990). It is the center of one of five “hot spots” for biotic rarity and richness in the continental United States (Stein et al. 2000). Now, a new species of *Liatris* can be added to the list of rare endemics found there.

For many years, local botanists, such as R.K. Godfrey and A.K. Gholson (pers. com.), have been aware of some unusual populations of blazing star in ravines and along the bluffs of the Apalachicola River in the Florida panhandle. The plants would most probably “key out” to *Liatris gracilis* Pursh, but they do not fit well.

Herz et al. (1984a) studied the chemistry of *Liatris gracilis*. Later, his team (Herz et al. 1984b) studied the “bluffs blazing star” and found that, in contrast to authentic *L. gracilis*, which contained an unusual group of germacrenolides, it possessed a distinctive group of heliangolides.

The Apalachicola bluff’s plants are distinctive morphologically and chemi-

cally but have not been given nomenclatural recognition. The most recent summary of the genus (King & Robinson 1987) makes no mention of this taxon; neither does Wunderlin (1998) in his guide to the flora of Florida. It is here named *Liatris gholsonii* to honor Angus K. Gholson of Chattahoochee, Florida, an indefatigable field botanist and astute student of the local flora. Together, he and Godfrey collected an extensive population series of this new species.

METHODS AND MATERIALS

Vegetative and floral features of the new species and of *Liatris gracilis* were measured from the extensive population samples vouchered at FSU. Flowering heads were softened in a weak solution of NaOH in 50% ethanol to return tissues to their hydrated size and to facilitate dissection. Meiotic chromosome counts were determined from fresh flower buds preserved in Carnoy's solution (6:3:1 parts alcohol: chloroform: acetic acid). Gholson's personal herbarium is here termed "AKG"; it will eventually become part of FLAS.

SPECIES DESCRIPTION

Liatris gholsonii L.C. Anderson, sp. nov. (**Fig. 1**). TYPE: UNITED STATES. FLORIDA. Liberty Co.: shaded upper slopes of No Name Ravine on the Nature Conservancy's Apalachicola Bluffs and Ravines Preserve, TIN, R7W, SW1/4 Sec 7, 13 Sep 2001, L.C. Anderson 19932 (HOLOTYPE: BRIT; ISOTYPES: FSU, MO, NY).

Herbae perennes plus minusve pubescentes et glanduloso-punctatae, caulibus 4.5–18.5 dm longis, eramosis infra inflorescentiam. Folia caulina inferiora petiolata 8–25 cm longa, laminis oblongo-lanceolatis 8–27 mm latis; folia superiora sessilia elliptica sursum sensim deminuentia. Inflorescentiae elongatae determinatae racemosae, pedicellis patentibus vel reflexis 2–26 mm longis. Bractae florales infimae sessiles, anguste ellipticae, 2–5.9 mm longae, 1.8–9 mm latae. Capitula turbinata 6–10 mm longa, phyllariis 8–15 plerumque acutis ad acuminatis. Flosculi disci 3–6, corollis infundibuliformibus 6.7–10 mm longis roseis ad purpureis. Achaenia 4.5–4.8 mm longa 10-costata pubescentia, pappo barbellato 5–6 mm longo.

Perennial herbs, with spherical corm-like rootstocks 2–2.5 cm wide; radical leaves (usually absent at anthesis) long-petiolate, 22–25 cm long, blades entire, narrowly elliptic-oblong, 20–26 mm wide, glabrate, finely glandular-punctate on both surfaces. Stems (4.5–)5.5–12(–18.5) dm long, terete, striate, unbranched below the inflorescence, pubescent with hairs appressed or spreading. Cauline leaves alternate, entire, numerous, much longer than internodes, punctate; lower leaves (8–)13–22(–25) cm long, the petioles (2.5–)4–7(–10) mm long, ciliate, blades elliptic to oblong-lanceolate, tapering at base and tip, (8–)11–22(–27) mm wide, midveins raised and sparsely villosulous; leaves gradually reduced in size and becoming sessile toward the inflorescence, grading to the leafy floral bracts with little change in size or shape. Inflorescence elongate, determinate, racemose (rarely paniculate in damaged plants or frequently so in garden plants), pedicels spreading or reflexed at anthesis, pubescent, (2–)5–12(–26) mm long on heads toward base of inflorescence. Lowest floral bracts sessile, narrowly



FIG. 1. Plant of *Liatris gholsonii* (Godfrey 76707.1, a relatively small plant with few leaves to facilitate scanning) and enlargement of one head from Anderson 19932.

elliptic to lanceolate, (2-)2.5-4.5(-5.9) cm long, (1.8-)2-6(-10) mm wide. Heads turbinate-cylindric, (6-)6.5-8.5(-10) mm long, phyllaries (8-)9-12(-15), green to dark purple, ovate to oblong, acute to acuminate (rarely obtuse), glandular-punctate, \pm ciliate, margins hyaline, white or roseate. Disk flowers 3-5(-6); corollas (6.7-)7-8.5(-10) mm long, narrowly funnellform, sparsely glandular punctate, throat pubescent internally, the tube ochroleucous or pinkish, the lobes pink to purple, slightly spreading to reflexed, (2.1-)2.5-3.6(-4.6) mm long; bifid styles pink, (11-)12-13(-14) mm long, anthers (2.5-)3.5-4(-4.4) mm long, with retuse appendages 0.2 mm long; mature achenes 3.5-5 mm long, 10-ribbed, gray except for raised, dull green ribs, narrowly turbinate, densely hispidulous, the

hairs 0.4–0.5 mm long, pappus strongly barbellate, 5–6 mm long, white, tinged with purple to give a dull rosy appearance. $n = 10$.

Phenology.—Primarily flowering from September to mid-October; a very few precocious plants blooming in early July and a few blooming in early November.

Habitat.—The species occurs in loamy sand or gravelly sand mostly in deep shade of deciduous woodlands on upper slopes of bayhead ravines or along the less shady ecotone between the woodland at tops of ravines adjoining more open scrub oak woodland. It also occurs in xeric to sub-mesic woodland and more or less open sites on bluffs facing the Apalachicola River or on sandy ridge tops between ravines.

Associated woody species include: *Asimina parviflora* (Michx.) Dunal, *Callicarpa americana* L., *Carya pallida* (Ashe) Engelm. & Graebn., *C. tomentosa* (Poir. in Lam.) Nutt., *Cornus florida* L., *Diospyros virginiana* L., *Forestiera godfreyi* L.C. Anderson, *Fraxinus americana* L., *Ilex opaca* Ait., *Juniperus virginiana* L., *Magnolia grandiflora* L., *Osmanthus americanus* (L.) Benth. & Hook. ex A. Gray, *Ostrya virginiana* (Mill.) K. Koch, *Persea borbonia* (L.) Spreng., *Pinus glabra* Walt., *Prunus alabamensis* Mohr, *Quercus alba* L., *Q. geminata* Small, *Q. hemisphaerica* Bartr., *Q. nigra* L., *Rhus copallina* L., *Sebastiania fruticosa* (Bartr.) Fern., *Sideroxylon lanuginosum* Michx., *Vaccinium arboreum* Marsh., and *Viburnum dentatum* L. A few herbaceous species are associates in the shaded sites, such as *Chasmanthium sessiliflorum* (Poir.) Yates, *Michella repens* L., *Smilax pumila* Walt., *Solidago arguta* Aiton, and *Spigelia marilandica* L.

Additional specimens examined (collections listed generally from north to south in occurrences): **FLORIDA. Liberty Co.:** Torreya State Park: 1 Oct 1972, R.K. Godfrey 72216 (FSU), pine-hardwood forest, 8 Oct 1972, R.K. Godfrey 72317 (FLAS, FSU); grassy trail in half shade, 9 Oct 1978, R.K. Godfrey 76707 (FSU—population sample of 16 sheets); Weeping Ridge, 21 Sep 1983, R.K. Godfrey 80984 (FSU); gravelly sandy soil, 12 Oct 1983, R.K. Godfrey 81020 (FSU); just S of park entrance, 17 Oct 1988, R.K. Godfrey 82931 (FSU); between picnic area and stone bridge, 24 Sep 1983, A.K. Gholson 9348 (AKG); Rock Hill, 27 Sep 1969, R.K. Godfrey 68853 (FSU); near Rock Bluff, 13 Oct 1956, Redfearn & Godfrey 1026 (FSU, NCU); tributary off Spotts Branch, Upper Sweetwater Creek, 6 Jul 1989 (few in bloom this date), R.K. Godfrey 83342 (FSU); N of Sweetwater at “old camp torreya,” 21 Sep 1983, R.K. Godfrey 80982 (FSU); ridge NW of Sweetwater, 5 Oct 2001, L.C. Anderson 20018 (FSU, FTG, US, VDB), 16 Nov 2001, L.C. Anderson 20075 (FSU), L.C. Anderson 20077 (FSU); Apalachicola River bluff W of Sweetwater, 16 Nov 2001, L.C. Anderson 20081 (FSU); near rte 270 between rte 12 and Sweetwater, 26 Sep 1980, R.K. Godfrey 78179 (FSU); No Name Ravine, 5 Oct 2001, L.C. Anderson 20009 (FSU); cultivated in nature garden at Apalachicola Bluffs and Ravines Preserve headquarters building, 5 Oct 2001, L.C. Anderson 20002 (BRIT, FSU, MO, NY, NCU, US), 20003 (BRIT, FSU, MO, NY); Beaver Dam Creek, 1.6 mi from rte 6 on rte 271, 15 Sep 1988, R.K. Godfrey 82866 (FLAS, FSU); 1.65 mi from rte 6 on rte 270, 27 Mar 1991 (vegetative), R.K. Godfrey 84073 (FSU); 1 mi from rte 12, 30 Sep 1983, R.K. Godfrey 80995 (AKG, FSU); arm of Little Sweetwater Creek, in shade, 30 Sep 1983, R.K. Godfrey 80992 (FSU, 4 sheets), in sun, 80993 (FSU-4 sheets, UWFP); head of Little Sweetwater Creek near junction rte 270 and rte 12, 21 Sep 1983, R.K. Godfrey 80975 (FSU); Alum Bluff, 10 Nov 1963, D.B. Ward 3727 (FLAS), in shade, 3 Oct 1983, R.K. Godfrey 81001 (FSU, 2 sheets), in sun, 81002 (FSU-3 sheets, UWFP); 4 Apr 1990 (vegetative), R.K. Godfrey 83776 (FSU); in open, 2 Oct 1983, A.K. Gholson 10643 (AKG, FSU), in shade, 2 Oct 1983, A.K. Gholson 10644 (AKG, FSU); ridge by Kelley Branch, in shade, 2 Oct 1983, R.K. Godfrey

80998 (FSU), in sun, R.K. Godfrey 80998 (FSU, 4 sheets), 2 Oct 1983, A.K. Gholson 10642 (AKG), 24 Sep 1988, L.C. Anderson 11834 (FSU).

DISCUSSION

Gaiser (1946) recognized 10 series of species in her monograph of *Liatris*. Series Graminifoliae (with obtuse, ciliolate phyllaries as in *L. gracilis*) and series Pauciflorae (which has generally larger heads with acuminate phyllaries that lack cilia) are relevant to this discussion. The phyllaries of *L. gholsonii* are ciliate (as in Graminifoliae) but usually acuminate (as in Pauciflorae). The distinctiveness of the two series was already diminished when Godfrey (1961) described *L. provincialis*; that Florida panhandle endemic has strongly acuminate but ciliolate phyllaries.

Gaiser (1950) studied the cytology in these series and found the species were all diploids ($n = 10$). The chromosomes were small with uniform karyotypes. For *Liatris gholsonii*, meiotic chromosome counts from buds of Anderson 19932 were $n = 10$; the chromosomes were also very small, so chromosome numbers and karyotypes are not distinctive features taxonomically.

The new species appears most closely related to *Liatris gracilis*; both have small heads on relatively long, usually spreading pedicels. The two differ in their ecology, chemistry (Herz et al. 1984a, b), and morphology. Typical habitat for *L. gholsonii* is on more or less mesic, shaded ravine slopes and bluffs; only a few plants occur in full sun (in openings in the canopy from tree-fall or along the ecotone between the ravine and the adjacent sandhills), whereas *L. gracilis* typically occurs in sunnier, more xeric, open flatwoods and savannas. The two species are not sympatric, but *L. gracilis* does occur nearby in the same county.

Foliage is perhaps the most distinguishing feature separating the two species. Basal leaves on young plants are broadly elliptic in *Liatris gholsonii* (as in Godfrey 84073), whereas they are narrowly lanceolate in *L. gracilis* (see photograph in Gaiser 1950). Flowering plants of *L. gholsonii* tend to retain more of the basal and lower cauline leaves, which are also wider (mostly 11–22 mm wide) than those of *L. gracilis* (4–13 mm wide). The transition between cauline leaves and floral bracts is gradual in the new species, and the floral bracts are mostly 2–6 mm wide, whereas they are narrower (1.0–1.8 mm wide) in *L. gracilis*.

One might think the differences in foliage could be products of the species' differing habitats. In general, plants of the same or related species grown in full sun have smaller, narrower leaves than those found on plants grown in the shade. However, the larger leaves of *L. gholsonii* are not due to habitat. The few collections of *L. gholsonii* taken in full sun were more robust plants that had shorter internodes, average-sized cauline leaves for the species, but wider floral bracts than plants from shadier sites. Plants grown in full sun tended to have more phyllaries in their involucre (and thus be more like those of *L. gracilis*) than those grown in shade.

Personnel of the Apalachicola Bluffs and Ravines Preserve established a wildflower garden in full sun near their headquarters building. The garden soil was enriched with mushroom compost and was given supplemental water. Seeds of *Liatris gholsonii* from No Name Ravine were sown in the garden in 1997, and many plants became established. These plants are somewhat atypical in having mostly two or three stems per rootstock and large, paniculate inflorescences. These “full sun” plants still had the characteristic leaves and floral bracts of *L. gholsonii*.

Several features of floral morphology tend to separate to two species, but variation is sufficient within each species that no single feature provides absolute identification. For example, phyllaries in the new species tend to be acuminate, but some plants have phyllaries that are only acute (or rarely obtuse), and phyllaries in *Liatris gracilis* are usually very obtuse (rounded apically), but a few specimens have phyllaries that are acute or rounded but mucronate. Summation of some floral measurements from over 30 samples per species is in Table 1. Plants of *L. gholsonii* tend to have shorter involucre (shortest in the genus) with fewer phyllaries, but their corollas and achenes tend to be larger than those of *L. gracilis*.

Differences between the two species in floral morphology (Table 1) are present (though minimal in some cases). The salient distinguishing features between the two taxa are mostly vegetative; the following key couplet provides a useful summary:

Lower floral bracts over 2 mm wide; lower cauline leaves elliptic, mostly over 12 mm wide; phyllaries usually acuminate, rarely obtuse _____ ***Liatris gholsonii***
 Lower floral bracts under 2 mm wide; lower cauline leaves lanceolate, mostly under 12 mm wide; phyllaries usually obtuse, rarely acute _____ ***Liatris gracilis***

Now the Florida panhandle has two endemic species of *Liatris*; *L. provincialis* is found in Franklin and Wakulla counties and is considered endangered in Florida (Coile 2000). The range of *L. gholsonii* is even more restricted; it ranges about 14 km from Torreya State Park to just south of Alum Bluffs and occurs on bluffs or in ravines only a short distance eastward from the Apalachicola River. The most distant population from the river is found in the headwaters of Sweetwater Creek about 9 km from the river. This species is clearly a candidate for listing as endangered.

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TABLE 1. Averages (and ranges) of selected floral features in *Liatris gholsonii* and *L. gracilis*.

	<i>Liatris gholsonii</i>	<i>Liatris gracilis</i>
Involucral length, mm	6.96(6.0–10.0)	7.62(5.5–10.0)
Phyllary number	10.69(8–15)	12.33(9–16)
Flower number	4.06(3–5)	4.30(3–7)
Corolla length, mm	7.84(6.8–9.8)	7.69(6.0–9.7)
Corolla lobe length, mm	3.09(2.1–4.6)	2.82(2.0–3.9)
Anther length, mm	3.80(2.6–4.5)	2.98(2.0–3.9)
Achene length, mm	4.07(3.5–5.0)	3.40(2.8–4.4)

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